

CLAIMS

- 1  
2 1. A liquid toner for electrostatic imaging which  
3 comprises:  
4 an insulating non-polar carrier liquid;  
5 at least one charge director; and  
6 toner particles dispersed in the carrier liquid, the  
7 particles comprising:  
8 a core material comprising a pigmented polymer  
9 which is unchargeable or weakly chargeable by the at least  
10 one charge director, but which is otherwise suitable for use  
11 as a toner material; and  
12 a coating of at least one ionomer component in  
13 an amount effective to impart enhanced chargeability to the  
14 ordinarily unchargeable or weakly chargeable particles.  
15  
16 2. A liquid toner for electrostatic imaging which  
17 comprises:  
18 an insulating non-polar carrier liquid;  
19 at least one charge director; and  
20 toner particles dispersed in the carrier liquid, the  
21 toner particles comprising:  
22 a core material which is chargeable to a first  
23 polarity by the at least one charge director; and  
24 a coating of at least one ionomer component in  
25 an amount effective, together the at least one charge  
26 director, to impart a charge having a polarity different  
27 from the first polarity to the coated particles.  
28  
29 3. Liquid toner according to claim 1 or claim 2, wherein  
30 the particles are synthetic resin particles.  
31  
32 4. Liquid toner according to any of the preceding claims  
33 wherein the ionomers are carboxylic acid based and  
34 neutralized with metal salts forming ionic clusters.  
35  
36 5. Liquid toner according to any of claims 1-3 wherein  
37 the ionomers are metacrylic acid based and neutralized with  
38 metal salts forming ionic clusters.

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2 6. Liquid toner according to any of claims 1-3 wherein  
3 the ionomers are sulfonic acid based and neutralized with  
4 metal salts forming ionic clusters.

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6 7. Liquid toner according to any of claims 1-3 wherein  
7 the ionomers are phosphoric acid based and neutralized with  
8 metal salts forming ionic clusters.

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10 8. Liquid toner according to any of claims 1-3 wherein  
11 the ionomers are ethylene based and neutralized with metal  
12 salts forming ionic clusters.

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14 9. A method for producing liquid toners for electrostatic  
15 imaging, which method comprises dispersing pigmented polymer  
16 particles in insulating non-polar carrier liquid, and mixing  
17 at least one ionomer which is not soluble at room  
18 temperature with the dispersion.

19 10. A method according to claim 9 wherein the ionomer is  
20 first heated to a temperature at which the ionomer dissolves  
21 in the carrier liquid and then cooled to a temperature  
22 whereat the ionomer is not soluble in the carrier liquid,  
23 thereby coating the particles with ionomer material.

24

25 11. A method according to claim 10 wherein the mixture is  
26 agitated at least during the step of cooling.

27

28 12. A method according to any of claims 9-11 and  
29 comprising the step of adding at least one charge director  
30 to the mixture.

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32 13. A method according to claim 10 or claim 11 and  
33 comprising the step of adding at least one charge director  
34 to the mixture after the step of cooling.

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36 14. A method according to claim 12 or claim 13 wherein the  
37 particles are formed of a material which in presence of  
38 charge director alone are ordinarily unchargeable or weakly

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1 chargeable, but are otherwise suitable for use as toner  
2 particles, and the at least one ionomer component is used in  
3 an amount effective to impart enhanced chargeability to the  
4 toner particles.

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6 15. A method according to claim 12 or claim 13, wherein the  
7 at least one ionomer component is used in an amount  
8 effective to reverse the polarity conventionally imparted to  
9 the material of the particles by the at least one charge  
10 director.

11

12 16. A method according to any of claims 9-15, wherein the  
13 particles are comprised of a synthetic resin.

14

15 17. A method according to any of claims 9-15 wherein the  
16 ionomers are carboxylic acid based and neutralized with  
17 metal salts forming ionic clusters.

18

19 18. A method according to any of claims 9-15 wherein the  
20 ionomers are metacrylic acid based and neutralized with  
21 metal salts forming ionic clusters.

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23 19. A method according to any of claims 9-15 wherein the  
24 ionomers are sulfonic acid based and neutralized with metal  
25 salts forming ionic clusters.

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27 20. A method according to any of claims 9-15 wherein the  
28 ionomers are phosphoric acid based and neutralized with  
29 metal salts forming ionic clusters.

30

31 21. A method according to any of claims 9-15 wherein the  
32 ionomers are ethylene based and neutralized with metal salts  
33 forming ionic clusters.

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35 22. Liquid toner according to any of claims 1-8 wherein  
36 the coating comprises less than 20 percent of the weight of  
37 the particles.

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1 23. Liquid toner according to any of claims 1-8 wherein  
2 the coating comprises less than 10 percent of the weight of  
3 the particles.

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5 24. Liquid toner according to any of claims 1-8 wherein  
6 the coating comprises less than 5 percent of the weight of  
7 the particles.

8

9 25. Liquid toner according to any of claims 1-8 or 22-24  
10 wherein the coating comprises a thickness effective in  
11 improving the chargeability of the toner particles.

12

13 26. Liquid toner according to any of claims 1-8 or 22-25  
14 wherein the coating comprises a thickness greater than or  
15 equal to a monolayer of the ionomer.

16

17 27. Liquid toner according to claim 26 wherein the coating  
18 comprises a thickness of greater than 0.02 micrometers.

19

20 28. An electrostatic imaging process which comprises the  
21 steps of:

22 forming a charged latent electrostatic image on a  
23 photoconductive surface;

24 applying to the surface toner particles from a liquid  
25 toner according to any of claims 1-8 or 22-27; and

26 transferring the resulting toner image to a substrate.

27

28 29. An electrostatic imaging process which comprises the  
29 steps of:

30 forming a charged latent electrostatic image on a  
31 photoconductive surface;

32 applying to the surface charged colorant particles  
33 from a liquid toner prepared according to the method of any  
34 one of claims 9-21; and

35 transferring the resulting toner image to a substrate.

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